

PATENT COOPERATION TREATY

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From the INTERNATIONAL SEARCHING AUTHORITY

To:

IBM UNITED KINGDOM LIMITED
Intellectual Property Law
Attn: Litherland, David Peter
Hursley Park
Winchester
Hampshire SO21 2JN
UNITED KINGDOM

NOTIFICATION OF THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing (day/month/year)	23/06/2005
FOR FURTHER ACTION See paragraphs 1 and 4 below	
International filing date (day/month/year)	09/11/2004

Applicant's or agent's file reference

ARC030051

International application No.

PCT/EP2004/052884

Applicant

INTERNATIONAL BUSINESS MACHINES CORPORATION

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report, however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Fascimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

Shortly after the expiration of 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the international Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within 19 months from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later); otherwise, the applicant must, within 20 months from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of 30 months (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the PCT Applicant's Guide, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentaan 2
NL-2280 HV Rijswijk
Tel. (+31-70) 340-3040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Katrin Sommermeyer

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference AR030051	FOR FURTHER ACTION		see Form PCT/SA/220 as well as, where applicable, item 5 below.
International application No. PCT/EP2004/052884	International filing date (day/month/year) 09/11/2004	(Earliest) Priority Date (day/month/year) 26/11/2003	
Applicant INTERNATIONAL BUSINESS MACHINES CORPORATION			

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 6 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box II).

3. ☒ **Unity of invention is lacking** (see Box III).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 39.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. _____

☐ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☒ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2004/052884

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☒ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
1-5, 7-9, 12-21
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-5,7-9,21

determining access rights to trusted dictionary

2. claim: 6

using security chip

3. claims: 10-11

handling copy-protected media

4. claims: 12-20

designing and debugging application

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/EP2004/052884

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G06F1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
X	SCOTT OAKS: "java security" May 2001 (2001-05), O'REILLY, SEBASTOPOL, CA95472, XP002321663 page 261 - page 287 page 309 - page 310 -----	1-5, 7-9, 21
A	US 2002/184520 A1 (BUSH WILLIAM R ET AL) 5 December 2002 (2002-12-05) abstract -----	1-5, 7-9, 21
A	EP 0 875 814 A (SONY CORPORATION) 4 November 1998 (1998-11-04) abstract -----	1-5, 7-9, 21
A	US 2003/135746 A1 (ABBOTT PAUL HARRY ET AL) 17 July 2003 (2003-07-17) abstract ----- ----- -/-	1-5, 7-9, 21

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

CJ document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to underscore the principle or theory underlying the invention

X document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

Z document member of the same patent family

Date of the actual completion of the international search

7 June 2005

Date of mailing of the international search report

23/06/2005

Name and mailing address of the ISA
European Patent Office, P. B. 5818 Patentlaan 2
NL - 2200 HV Hilversum
Tel. (+31-70) 340-2040, Tlx. 31 651 epo nl
Fax: (+31-70) 340-3016

Authorized officer

Meződi, S

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/EP2004/052884

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 651 111 A (MCKEEMAN ET AL) 22 July 1997 (1997-07-22) abstract -----	12-20
A	US 2001/037450 A1 (METLITSKI EVGUENY A ET AL) 1 November 2001 (2001-11-01) abstract -----	12-20
A	SUN MICROSYSTEMS, INC.: "JPDA Overview" J2SDK/J2RE - 1.4.1_07 DOCUMENTATION, 'Online! 27 September 2001 (2001-09-27), XP002330722 SUN DEVELOPER NETWORK Retrieved from the Internet: URL:http://java.sun.com/products/archive/index.html> 'retrieved on 2005-07-06! the whole document -----	12-20
A	SUN MICROSYSTEMS, INC.: "Java Platform Debugger Architecture" J2SDK/J2RE - 1.4.1_07 DOCUMENTATION, 'Online! 27 September 2001 (2001-09-27), XP002330723 SUN DEVELOPER NETWORK Retrieved from the Internet: URL:http://java.sun.com/products/archive/index.html> 'retrieved on 2005-07-06! the whole document -----	12-20

INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

PCT/EP2004/052884

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2002184520	A1	05-12-2002	EP 1430374 A2 WO 02097594 A2	23-06-2004 05-12-2002
EP 0875814	A	04-11-1998	JP 10301773 A CN 1208193 A ,C EP 0875814 A2 TW 405096 B US 6647495 B1	13-11-1998 17-02-1999 04-11-1998 11-09-2000 11-11-2003
US 2003135746	A1	17-07-2003	NONE	
US 5651111	A	22-07-1997	EP 0686916 A1	13-12-1995
US 2001037450	A1	01-11-2001	AU 4336501 A WO 0165366 A1	12-09-2001 07-09-2001

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/EP2004/052884

International filing date (day/month/year)
09.11.2004

Priority date (day/month/year)
26.11.2003

International Patent Classification (IPC) or both national classification and IPC
G06F1/00

Applicant
INTERNATIONAL BUSINESS MACHINES CORPORATION

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office
D-80288 Munich
Tel +49 89 23399 - 0 Tx: 523656 epmu d
Fax: +49 89 23399 - 4465

Authorized Officer

Meződi, S

Telephone No. +49 89 23399-6092



**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/EP2004/052884

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/EP2004/052884

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos. 6, 10-11

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☒ no international search report has been established for the whole application or for said claims Nos. 6, 10-11

☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:

the written form

☐ has not been furnished

☐ does not comply with the standard

the computer readable form

☐ has not been furnished

☐ does not comply with the standard

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-bis of the Administrative Instructions.

☐ See separate sheet for further details

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/EP2004/052884

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has:
- ☒ paid additional fees.
 - ☐ paid additional fees under protest.
 - ☐ not paid additional fees.
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
 - ☒ not complied with for the following reasons:
see separate sheet
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☐ all parts.
 - ☒ the parts relating to claims Nos. 1-5,7-9,12-21

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	2-5,7-9,12-21
	No: Claims	1
Inventive step (IS)	Yes: Claims	
	No: Claims	1-5,7-9,12-21
Industrial applicability (IA)	Yes: Claims	1-5,7-9,12-21
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item IV.

The separate inventions/groups of inventions are:

- 1-5,7-9,21: determining access rights to trusted dictionary
- 6: using security chip
- 10-11: handling copy-protected media
- 12-20: designing and debugging application

They are not so linked as to form a single general inventive concept (Rule 13.1 PCT) for the following reasons:

The application lacks unity within the meaning of Article 17 (3)(a) PCT for the following reason:

The single general concept linking together the claims 1-11; 12-20 is a method for running a tamper-resistant application in a trusted environment.

This concept is generally known in the prior art.

Furthermore, the single general concept linking together the claims 1-5, 7-9, 21; 6; 10-11 is that the method comprises all features listed in claim 1.

But, a method comprising all these features is known in the prior art, e.g. from a UNIX workstation running JAVA, see SCOTT OAKS: "JAVA SECURITY", ISBN 0-596-00157-6 (citations refer to this document):

- defining a trusted virtual machine environment (a JAVA virtual machine provides security and is therefore to be trusted)
- that contains a trusted dictionary for protecting data (the file system, using the UNIX permission system and the security manager of JAVA, is already a trusted dictionary. Furthermore, databases are commonly used to further extend the functionality, if needed)
- verifying the integrity of the application (commonly done with signed classes, see pg. 272)
- if the application is tampered with, the trusted virtual machine environment prevents the application from accessing secrets in the trusted dictionary, thus disabling the normal operation of the application (see also pg. 272, 273)

Therefore the single general concept is not new and not inventive, contrary to Rule 13.1

PCT.

The special technical features of the groups of claims over said prior art are:

1. determining access rights to trusted dictionary
2. using security chip
3. handling copy-protected media
4. designing and debugging application

It is clear that there is no technical relationship among these technical features, contrary to Rule 13.2 PCT

Re Item V.

1. Reference is made to the following document:

D1: SCOTT OAKS: "java security" May 2001 (2001-05), O'REILLY, SEBASTOPOL,
CA95472, XP002321663

2. 1st invention
- 2.1 Independent claim

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT.

A method comprising all features of claim 1 is known in the prior art, e.g. from a UNIX workstation running JAVA, see D1 (citations refer to this document):

- defining a trusted virtual machine environment (a JAVA virtual machine provides security and is therefore to be trusted)
- that contains a trusted dictionary for protecting data (the file system, using the UNIX permission system and the security manager of JAVA, is already a trusted dictionary. Furthermore, databases are commonly used to further extend the functionality, if needed)
- verifying the integrity of the application (commonly done with signed classes, see

pg. 272)

- if the application is tampered with, the trusted virtual machine environment prevents the application from accessing secrets in the trusted dictionary, thus disabling the normal operation of the application (see also pg. 272, 273)

2.2 Dependent claims

Dependent claims 2-5, 7-9, 21 do not contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to inventive step, because all additional features are either known from D1 or common general knowledge.

3. 4th invention

3.1 Independent claim

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 12 does not involve an inventive step in the sense of Article 33(3) PCT.

The problem to be solved by the present alleged invention may be regarded as producing a tamper-resistant application in a trusted virtual machine environment.

- It would be obvious from common general knowledge that it must be determined whether any aspect of the application needs to be tamper-resistant.
- It would be obvious from common general knowledge that if any aspects of the application need to be tamper-resistant, the access to this predefined set of application functions must be restricted, thereby defining one or more trusted bundles comprising these functions.
- It would be obvious from common general knowledge that in order to debug the application, the virtual machine that is used needs random access to these functions, consequently it cannot be trusted, that means these functions must be debugged on a non-trusted virtual machine.
- It would be obvious from common general knowledge that in order to achieve

tamper-resistance, the application must be deployed in the trusted virtual machine environment.

Solving the problem, the skilled person would include all features listed above in a method of producing a tamper-resistant application and thereby arrive at the subject-matter of claim 12 without an inventive step.

3.2 Dependent claims

Dependent claims 13-20 do not contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to inventive step, because all additional features are either known from D1 or common general knowledge.